09/919,372

L Number	Hits	Search Text	DB	Time stamp
1	4355444	clock distribution circuit	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:14
2	2303156	phase detector$1	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:15
3	453025	(clock distribution circuit) with (phase detector$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:19
4	1643180	generat$3 and (clock signal$1 with error signal$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:21
5	233141	((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:25
6	4682306	loop filter circuit	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:26
7	224627	(((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:30
8	1221430	pulse generator$1 and (pulse signal$1 with clock signal$1)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:33
9	152267	((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:40

10	622		USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:42
		"6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046"		

| 11 | 337 | (((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
"6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
"5952857"
"6239647"
"4415984"
"4479216"
RE31828
"4613828"
"4801819"
"4905006"
"5210546"
"5257294"
"5359232"
"5459762"
"5600839"
"5612980"
"5621705"
"5628019"
"5633879"
"5646672"
"5724360"
"5774321"
"5787261"
"5805603"
"5901116"
"6052004"
"6058152"
"6078225"
"6094076"
"6160542"
"4361897"
"4375088"
"4376268"
"4399412"
"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046"
) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:42 |
| 12 | 70917 | summing and (error signal$1 with composite error signal$1) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:43 |

| 13 | 24 | ((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and ("6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046")) and (summing and (error signal$1 with composite error signal$1)) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:43 |
| 14 | 3492556 | arbiter circuit$1 | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:43 |

| 15 | 24 | (((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
"6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
"5952857"
"6239647"
"4415984"
"4479216"
RE31828
"4613828"
"4801819"
"4905006"
"5210546"
"5257294"
"5359232"
"5459762"
"5600839"
"5612980"
"5621705"
"5628019"
"5633879"
"5646672"
"5724360"
"5774321"
"5787261"
"5805603"
"5901116"
"6052004"
"6058152"
"6078225"
"6094076"
"6160542"
"4361897"
"4375088"
"4376268"
"4399412"
"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046"
)) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1) | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:44 |
| 16 | 968045 | synchronize local clock | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:44 |

| 17 | 23 | ((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
"6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
"5952857"
"6239647"
"4415984"
"4479216"
RE31828
"4613828"
"4801819"
"4905006"
"5210546"
"5257294"
"5359232"
"5459762"
"5600839"
"5612980"
"5621705"
"5628019"
"5633879"
"5646672"
"5724360"
"5774321"
"5787261"
"5805603"
"5901116"
"6052004"
"6058152"
"6078225"
"6094076"
"6160542"
"4361897"
"4375088"
"4376268"
"4399412"
"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046"
)) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:45 |
| 18 | 225249 | synchroniz$3 and (phase$1 with clock signal$1) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:45 |

| 19 | 15 | (((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and ("6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046")) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1)) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:45 |
| 20 | 3861079 | integrated circuit | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:45 |

| 21 | 15 | ((((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and ("6066969" "6088255" "4816700" "5870595" "6041073" "4475085" "5212410" "5630102" "5920222" "5952857" "6239647" "4415984" "4479216" RE31828 "4613828" "4801819" "4905006" "5210546" "5257294" "5359232" "5459762" "5600839" "5612980" "5621705" "5628019" "5633879" "5646672" "5724360" "5774321" "5787261" "5805603" "5901116" "6052004" "6058152" "6078225" "6094076" "6160542" "4361897" "4375088" "4376268" "4399412" "4454607" "4499459" "4512028" "4527075" "4542347" "4547667" "4557606" "4580047" "4580046")) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1))) and (integrated circuit) | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:46 |
| 22 | 3736085 | synchroniz$3 with clock signal$1 | USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB | 2004/03/18 17:46 |

23	15	(((((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:46
		"6066969"		
		"6088255"		
		"4816700"		
		"5870595"		
		"6041073"		
		"4475085"		
		"5212410"		
		"5630102"		
		"5920222"		
		"5952857"		
		"6239647"		
		"4415984"		
		"4479216"		
		RE31828		
		"4613828"		
		"4801819"		
		"4905006"		
		"5210546"		
		"5257294"		
		"5359232"		
		"5459762"		
		"5600839"		
		"5612980"		
		"5621705"		
		"5628019"		
		"5633879"		
		"5646672"		
		"5724360"		
		"5774321"		
		"5787261"		
		"5805603"		
		"5901116"		
		"6052004"		
		"6058152"		
		"6078225"		
		"6094076"		
		"6160542"		
		"4361897"		
		"4375088"		
		"4376268"		
		"4399412"		
		"4454607"		
		"4499459"		
		"4512028"		
		"4527075"		
		"4542347"		
		"4547667"		
		"4557606"		
		"4580047"		
		"4580046"		
		)) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1))) and (integrated circuit)) and (synchroniz$3 with clock signal$1)		
24	72849	jitter$1 or skew	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/18 17:47

| 25 | 6 | ((((((((((((clock distribution circuit) with (phase detector$1)) and (generat$3 and (clock signal$1 with error signal$1))) and (loop filter circuit)) and (pulse generator$1 and (pulse signal$1 with clock signal$1))) and (
"6066969"
"6088255"
"4816700"
"5870595"
"6041073"
"4475085"
"5212410"
"5630102"
"5920222"
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"6239647"
"4415984"
"4479216"
RE31828
"4613828"
"4801819"
"4905006"
"5210546"
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"5359232"
"5459762"
"5600839"
"5612980"
"5621705"
"5628019"
"5633879"
"5646672"
"5724360"
"5774321"
"5787261"
"5805603"
"5901116"
"6052004"
"6058152"
"6078225"
"6094076"
"6160542"
"4361897"
"4375088"
"4376268"
"4399412"
"4454607"
"4499459"
"4512028"
"4527075"
"4542347"
"4547667"
"4557606"
"4580047"
"4580046"
)) and (summing and (error signal$1 with composite error signal$1))) and (arbiter circuit$1)) and (synchronize local clock)) and (synchroniz$3 and (phase$1 with clock signal$1))) and (integrated circuit)) and (synchroniz$3 with clock signal$1)) and (jitter$1 or skew) | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:47 |
| 26 | 2391 | 714/700.ccls. or 714/707.ccls. or 714/738.ccls. or 714/798.ccls. or 714/799.ccls. or 714/814.ccls. or 714/812.ccls. | USPAT;
US-PGPUB;
EPO; JPO;
DERWENT;
IBM_TDB | 2004/03/18 17:50 |

(19) **United States**

(12) **Patent Application Publication** (10) Pub. No.: US 2002/0140477 A1

Zhou et al. (43) Pub. Date: Oct. 3, 2002

(54) DUTY CYCLE CORRECTION CIRCUIT AND APPARATUS AND METHOD EMPLOYING SAME

(76) Inventors: Jian Zhou, Plano, TX (US); Robert Payne, Plano, TX (US); Huanzhang Huang, Dallas, TX (US); Douglas Wente, Plano, TX (US)

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(52) U.S. Cl. 327/175

(57) ABSTRACT

The duty cycle for a periodic signal such as a clock signal is idealized by feeding back duty cycle information. Duty cycle information is detected by a capacitor connected in serial with a resistor across the outputs of a feedback differential transistor pair. Over time, the capacitor will be charged or discharged when the duty cycle varies from fifty percent. The detected duty cycle information is fed back to an amplifier where the incoming clock signal is mixed with the feedback signal. The amplifier itself comprises a first differential comparator stage receiving the uncorrected clock signal, a gain stage that amplifies and level shifts the feedback signal, and a second differential pair receiving the amplified feedback signal.